THE ASTRONAUT

Journal of the Manchester Interplanetary Society

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Courtesy *The British Interplanetary Society*

MR. P. E. CLEATOR,
who contributes *The Rocket Ban* and *Lusus Naturæ*
to this issue.

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Editor - - - H. E. TURNER

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EDITORIAL

During the eighteen months that have elapsed since its inauguration, the Society has progressed considerably. And we shall continue to progress, for our efforts to stimulate public interest in the possibilities of rocket flight, will be greatly assisted by the appearance of this improved journal. Unfortunately, owing to the exigencies of space, several items, such as Society proceedings and news, have been excluded from this issue. However, these features will be included in subsequent issues, which will be enlarged to sixteen pages.

In the last issue of the *Astronaut*, mention was made of a proposed Research Meeting. At that time, it was hoped to hold the meeting before the end of last year, but due to time required to construct all apparatus, this hope was not realised. However, models are now nearing completion and the Meeting will be included in the experimental programme for this year. Tests will be commenced at the earliest opportunity, the results of which will be published in future numbers of the journal.

Due to the exceptionally bad weather, and a corresponding exceptionally bad attendance at the meeting at Headquarters during this month, it was impossible to draft out plans for the 1938 Experimental Programme, but this will be done at the next meeting. If the proposed affiliation with the British Interplanetary Society materialises, this programme may have to be modified to some extent, in order to prevent a useless duplication of effort in experimental work.

These three factors—the improved journal, the pending affiliation with the British Interplanetary Society, and a new experimental programme—indicate that the New Year holds considerable promise for the Society. In order to further our efforts, we would earnestly request all members to do their utmost to interest persons in the activities of the Society. For an increased membership, by adding to our present slender financial resources, would enable us to conduct a far more ambitious research programme than has previously been possible. In addition, it would ensure the regular publication of the *Astronaut*, which at the present state of affairs is a vital necessity. Since the journal is a heavy burden on the funds of the Society, members are carrying on research at their own expense. We should like to mention that a Research Fund has been established, contributions to which will be gratefully received by the Hon. Treasurer.

THE ROCKET BAN

Expounded in the Socratic Manner
by P. E. CLEATOR
(Author of *Rockets Through Space*)

What is the truth concerning the conflicting accounts of an alleged ban on rocket experimentation in England? Is it, or is it not, permitted in this land of the free?

The British Government has placed no ban on rocket experimentation. It merely chooses, in its inscrutable wisdom, to surround the enterprise with conditions which effectively preclude the possibility of its being legally carried out anywhere within These Isles. But there is, I repeat, no actual ban on such experimentation. Any British subject in, or past, his 'teens, who is not a murderer, an adulterer, or a traitor to the flag in receipt of Russian gold, is at liberty to engage in rocket experimentation, providing he undertakes strictly to observe the prescribed conditions.

An example will make the position clear. Let us suppose that you are imbued with the idea of swimming the English Channel. For years you have been preparing yourself for your aquatic adventure. Then, and almost at the last moment, you make a disconcerting discovery. Before you can launch your anatomy in the general direction of the French coast, you find that it is necessary to obtain the sanction and formal blessing of the Home Office. Here, you encounter unexpected difficulties. Can you swim? Who was Captain Webb? Have you ever paid your income-tax? Do you say your prayers? Is it your intention to take your mother-in-law along with you?

Having answered these questions to the best of your ability, you finally elicit the fact that Channel swimming is officially frowned upon. An ancient Swimming Act, originally designed to prevent a mass desertion, *per aquam*, of the disheartened British infantry during the Napoleonic Neurosis, stands between you and your ambition. It transpires, however, that the Government has no desire actually to ban Channel swimming. It merely seeks to discourage it, within the meaning of the Act. Hence, the enterprise is the subject of certain conditions. You will graciously be permitted to proceed, providing:—

(*a*) Your hands, for the duration of the journey, are manacled behind your back;

(*b*) Your legs are lashed firmly together with rope of a specified make; and

(*c*) You most solemnly undertake not to contaminate, by expectoration or otherwise, your fluidiform surroundings, or in any way threaten by pollution the piscatorial inhabitants thereof.

Surely your allegorisation is somewhat exaggerated?

I leave it to any fair-minded man to decide. I am informed that before any scheme of experimentation with rockets can be undertaken in These Isles, it appears to the Secretary of State that the following conditions (among others) would have to be fulfilled:—

(*a*) A suitable range would have to be found and approved by the police authorities concerned;

(*b*) His advisers would have to be in a position to assure him that, in their opinion, the design of the rocket was sound and that it could be fired with reasonable safety; and

(*c*) The filling of the rocket would have to take place on premises licensed under the Explosives Act, 1875, and the filling would have to be of an approved composition.

It is added, moreover, that it might, of course, be necessary to impose other conditions in the light of the particular experiment. Finally, and yet worse, it is stated that approval could not in any event be given for a liquid oxygen-petrol filling.

So what?

Take condition (*a*). Alone, it has every appearance of sweet reasonableness—though there is no guarantee that a range which seemed eminently suitable to experimenters would gain the approval of the local *Polizei*. Off-hand, I should say that the chances would be about ten-to-one against. But consider condition (*a*) in conjunction with the first clause of condition (*c*). The filling of the rocket, the latter states, must take place on premises licensed under the Explosives Act, 1875. Let us optimistically suppose that the nearest such premises are located a mere 250 miles from the approved range, assuming for the moment that England contains such a thing as an approvable range. And let us further suppose that the workshop wherein the rocket is to be constructed is also situated but 250 miles from the licensed premises *and* the hypothetical approved range. We thus obtain an eternal

triangle circumscribed by a vicious circle. On every occasion that it is desired to test a rocket prior to the actual shooting thereof, there will be entailed a journey from the workshop to the premises licensed under the Explosives Act, 1875, a journey from the premises licensed under the Explosives Act, 1875, to the approved range, and yet another journey from the approved range back to the workshop. And this circular, migratory tour may well have to be made a dozen times or more before a single rocket is completely tested and ready for shooting!

Realising the inconvenience of, and the waste of time and money that would be occasioned by, such a procedure, the Government offers absolution under condition (*b*), the suggestion being that by its disapproving of the design of the rocket in the first place, the necessity for subsequent experimentation, *i.e.*, *any* experimentation, with its attendant inconveniences, would no longer exist. And, *a priori*, can you imagine a group of Governmental advisers deciding that the design of an experimental rocket motor is sound when, forsooth, the proposed design is as yet untried, and the exact manner of its functioning largely unpredictable? Or can you imagine their decreeing that the design, embodying, as it does, something devilish and new, cannot be other than *un*sound? There is no need to ponder which. Experimentation is thus attacked at its very roots. The right to reject a design merely because it is *thought* unsound holds little promise that the crucial test of actual experimentation will ever be permitted to be applied. The only experimentation, so-called, permissible under such a scheme, indeed, will be a mere and useless repetition of past experiments, the outcome of which can be predicted because, the experiments having previously been performed, the outcome is already known!

Finally, consider jointly the two clauses of condition (*c*). First, there is the requirement that the rocket be filled on premises licensed under the Explosives Act. Can you visualise a rocket being charged with rapidly evaporating liquid oxygen, and then being conveyed to an approved range possibly 250 or more miles away? Or conceive a drop of the charge remaining in the fuel tanks after the first few minutes of the journey? Then you do not need to do so. The latter clause of condition (*c*) provides that the filling must be an approved composition, and it is elsewhere declared that approval could not in any event be given of the liquid oxygen-petrol mixture.

Thus, providing a suitable range can be found; and providing the suitable range is approved of by the police authorities concerned; and providing the design of the rocket is, in the opinion of the advisers of the Secretary of State, sound; and providing it is considered by the aforementioned advisers that the rocket can be fired with reasonable safety; and providing the filling of the rocket takes place on premises licensed under the Explosives Act, 1875; and providing any other provisos which it may be considered necessary to impose in the light of the particular experiment are met, we learn that British would-be rocket experimenters may, by the grace of God and the Secretary of State, shoot a *powder* rocket. Which is to say, at great inconvenience and unnecessary expense, experimenters are entitled to waste further time and money constructing, testing, and shooting an archaic device abandoned by contemporaries throughout the world more than a decade ago!

But there is, nevertheless, no ban on rocket experimentation in England?

Plainly not. It is clearly no fault of the British Government that powder rockets are of no use to experimenters, any more than it is the fault of the Government that aeroplanes now form an important part of the Naval Service. (It was in 1907 that the First Lord of the Admiralty, when offered machines that could fly a hundred miles at forty miles an hour, replied through his inevitable advisers that the aeroplane was of "no practical use.") To-day, the Secretary of State makes it perfectly clear that providing the prescribed conditions are observed, rocket experimentation may be undertaken by any citizen who is so inclined. Thus *Englanders* are born with an inalienable right to shoot rockets, for which cherished privilege a day each year is actually set apart that it may be exercised to the full. Each November 5th, indeed, by special dispensation, even the question of an approved range is generously waived. Thus the glorious and traditional freedom enjoyed by the inhabitants of These Isles is faithfully upheld. Thus England, once again, shows the world what it means to be British. And thus it is that if matters remain as they at present are, England may expect to witness liquid fuel rocket experimentation at 3 o'clock on the afternoon of the Friday following the third day after the Resurrection Morn.

GENESIS OF THE ROCKET

By S. DAVIES and H. E. TURNER

The origin of the rocket is uncertain, but the probability is that the device has been known for a thousand years or so. It has been suggested, and with no little plausibility, that following the discovery of gunpowder (supposedly by the Chinese), the invention of the rocket was inspired by the old fire arrow. Be this as it may, the earliest known reference to rockets is contained in a Chinese document describing the battle of Pien-king. In this conflict, rockets were used as a weapon of war.

Thereafter, and until the beginning of the nineteenth century, the rocket appears to have remained unchanged. Then Sir William Congreve, an English artillery expert, gave it an iron case instead of a paper one. The result was a projectile with a range of some two miles, capable of carrying an explosive or incendiary charge weighing not more than twenty-four pounds. As such, it was essentially a weapon of war, and was actually so used to bombard Boulogne in 1806. Four years later, a Field Rocket Brigade was formed—subsequently to distinguish itself in the Battle of Waterloo. Towards the middle of the century, however, the rocket as a weapon of war fell into disuse: at best it was uncertain in action and difficult properly to aim, and improvements in ordinary artillery soon rendered it obsolete.

Meanwhile, the rocket emerged as a means of *saving* life: it was demonstrated that it was possible, and feasible, to carry a life-line to ships in distress with its aid. And to-day, as is well known, the rocket comprises an essential part of the equipment of coast-guard stations. Incidentally, it is of interest to note in this connection that in 1855, Colonel Boxer introduced the double, or "step" rocket. He placed two rockets end to end in a single case. On ignition, the first rocket carried the entire projectile upwards until its fuel was exhausted, at which point it ignited the second. The projectile was thus given an additional impetus, and a greatly increased range thereby attained. Some seven decades later, this improvement was to assume a position of paramount importance in astronautics.

Perhaps the first person to fire a rocket successfully without the cumbersome guiding stick was George Ellery Hale, an American astronomer. In 1868, experiments

were made with a metal rocket in which the conventional stick was replaced by three inclined shields, similar in shape to the blades of a screw-propeller. By means of vents bored in the base of the rocket, the escaping exhaust gases were made to impinge upon the shields, creating a rotary motion. Thus stabilised, the rocket travelled nose first.

The first actually to advocate the rocket as a method of propulsion, eminently suitable for space travel, appears to have been Konstantin Edouardovitch Ziolkowsky, a Russian scientist. His first thesis on the subject was published in a monthly scientific journal, *Na-utschnoje Obosrenije*, in 1903. At the time, however, his ideas were not favourably received, and were soon forgotten. But a few years later, three other scientists, working independently and unknown to each other, became interested in the question—Robert Esnault-Pelterie (France), Dr. Robert H. Goddard (America) and Professor Hermann Oberth (Germany).

Esnault-Pelterie began a theoretical investigation of the possibilities of space travel in 1907. The resultant calculations were extended in 1912, prior to their presentation to the Société Française de Physique. On June 8th, 1927, he addressed the main assembly of the French Astronomical Society—advocating the rocket as a means of exploring the upper atmosphere and, ultimately, effecting the conquest of space. The following year, this lecture, considerably enlarged, was published in book form, under the title *L'Astronautique*. Yet another lecture was delivered on May 25th, 1934, to the Société des Ingenieurs de France—and duly published a year later as *L'Astronautique Complement*. Meanwhile, with the aid of his friend, Andre Hirsch, Esnault-Pelterie had founded the REP-Hirsch award—an annual prize of 5,000 francs, offered to the person responsible for the most notable advance in the new science of astronautics. The first award was made to Professor Oberth in June, 1929, in recognition of his invaluable researches, both theoretical and practical.

And now let us turn to America. Dr. Robert H. Goddard first became interested in the possibilities of the rocket in 1912, at which time he was at Princeton University. The promising nature of his findings prompted him to conduct a series of preliminary experi-

ments, which were made under the auspices of the Smithsonian Institute. These experiments, which were made at Clarke University, Worcester, U.S.A., mainly concerned an investigation of the energy content of various types of powder fuel. The result of this research was published in 1919 in a report to the Smithsonian Institute, entitled *A Method of Reaching Extreme Altitudes*. Later, and as a result of this research, Dr. Goddard announced that, theoretically at least, it should be possible to shoot a rocket-propelled vessel to the moon.

Little is known of the subsequent work until 1929, except that, after exhaustive experiments with powder fuels, he eventually turned his attention to liquid propellants. What, indeed, is claimed to be the first liquid fuel rocket ever shot was fired by Dr. Goddard on July 17th, 1929. This projectile, which was constructed of metal, and measured some nine feet in length and twenty-eight inches in diameter, was launched from a steel tower forty feet in height. The rocket achieved an altitude of 900 feet, and then exploded. Nevertheless, as a result, it is said, of this experiment, the late Simon Guggenheim donated the sum of £20,000 for further research. Thus fortified, Dr. Goddard retired to Roswell, New Mexico, and there established a laboratory.

Thereafter, no further news was forthcoming until the end of 1934, when Dr. Goddard gave out a brief description of his work. Subsequently, a published report appeared entitled *Liquid-Propellant Rocket Development*.

(NOTE: *This is the first of a series of articles on the development of the rocket by Messrs. Davies and Turner. The second article will appear in the next issue.*)

A lecture on interplanetary travel was given to the Leeds Astronomical Society by Mr. D. W. F. Mayer, a Leeds member, on Monday, January 31st.

LUSUS NATURÆ

By P. E. CLEATOR

(AUTHOR'S NOTE: *It has amused me immensely to observe the staid and majestic NATURE carrying on a seemingly interminable crusade—under the banner of a fair hearing for the unorthodox*! *Nor is my delight lessened by the fact that the cause of this Unholy War happens to be my ROCKETS THROUGH SPACE. Nevertheless, I do not join in the fray, but merely indicate it—with thumb on nose and fingers pointing rigidly to high heaven.*)

EXHIBIT A

(Extract from *Nature* for 14th March, *anno Domini*, 1936)

ROCKETS THROUGH SPACE

Even the man of science, devoted as he is to the open-minded examination of the facts of Nature as he finds them revealed by experiment, completely free as he should be of dogma and preconceived ideas when these do not agree with new facts, finds himself occasionally the target of abuse, accused of obscurantism, prejudice and an unwillingness to abandon orthodox ideas. On these occasions he should be meticulously careful to give the advocate of unorthodoxy a fair hearing, and in this spirit we approach Mr. Cleator's book . . . . .

Mr. Cleator thinks it a pity that the Air Ministry evinced not the slightest interest in his ideas; provided that an equal indifference is shown by other Ministries elsewhere, we all ought to be profoundly thankful.

EXHIBIT B

(Extract from *Nature* for 16th May, *anno Domini*, 1936)

DEVELOPMENT OF ROCKETS FOR HIGH ALTITUDE EXPLORATION

Our readers who are interested in the development of rocket propulsion, and may have read a review in *Nature*

of March 14th of a somewhat premature book on the possibilities of using rockets for interplanetary travel, will be glad to hear that an authoritative statement has been issued by the Smithsonian Institution concerning the researches carried out by Dr. Robert H. Goddard . . . . .

It is good to hear that such experiments are being carried out, and the sober objectivity of Dr. Goddard's work presents a sharp contrast to the unscientific imagination exhibited by those who seek to direct attention to the advent of interplanetary travel long before the preliminary investigations that might throw light upon its possibility, or otherwise, have been completed.

EXHIBIT C

(Extract from *Nature* for 20th November, *anno Domini*, 1937)

ZERO TO EIGHTY

It may not be generally known that there is a British Interplanetary Society and an American Rocket Society, the members of which are heralding the dawn of interplanetary travel. In his volume "Rockets Through Space," published last year, Mr. P. E. Cleator, president of the former, has given an account of the unsuccessful attempts which have been made to make a rocket leave the earth and visit other planets. Dr. E. F. Northrup, in "Zero to Eighty" . . . . .

EXHIBIT D

(THINGS TO COME)

MAN REACHES MOON

Word has just been received that the much-heralded attempt to reach and land upon the moon has, by some mischance, been successful. We need hardly remind our readers that in the unlikely event of the foolhardy adventurers making a safe return to earth, it will be thanks neither to Mr. P. E. Cleator nor to his somewhat premature book on the possibilities of using rockets for interplanetary travel.

NEW MEMBERS

The following new members have been elected since November last:—

HONORARY MEMBER

P. E. CLEATOR, Wallasey.

MEMBERS

H. E. HIGGINBOTTOM, Levenshulme, Manchester.
T. L. MACDONALD, B.Sc., F.R.A.S., Glasgow, W.2.
D. W. F. MAYER, Roundhay, Leeds, 8.

ASSOCIATE MEMBERS

A. G. HOPLEY, Worsley, Lancs.
A. L. LAYCOCK, Whitefield, Manchester.
S. HOROBIN, Levenshulme, Manchester.
S. RAISTRICK, Fairfield, Manchester.

ASSOCIATES

S. HARRIS, Grimsby.
Miss M. H. HOLMES, Harpurhey, Manchester.
J. D. STEWART, Paisley.
J. S. DUCKWORTH, Prestwich, Manchester.

We regret to announce that the following members have resigned from the Society:—

E. Burgess, T. Cusack and Miss E. M. Davis.

The membership fees to the Society are:—

MEMBER—7/6 annually; 2/- quarterly.
ASSOCIATE MEMBER—5/- annually; 1/6 quarterly.
ASSOCIATE—2/6 annually.

All members receive free copies of the publications of the Society.

The Editor invites contributions to the *Astronaut* dealing with astronautics and allied sciences, such as astronomy, radio and meteorology. All matter should be typewritten or in clear script. Communications in connection with the journal should be addressed to the Editor, 41, Longford Place, Victoria Park, Manchester, 14, England.

Neither the Society nor the Editor hold themselves responsible for statements made or opinions expressed by the contributors to the *Astronaut*.